CLAIMS

THAT WHICH IS CLAIMED IS:

1. A method for interleaving in a retransmission based communication system comprising:

generating a message for transmission using a first interleaving protocol;

transmitting the message to a destination device;

receiving a request for retransmission of the message;

generating a second copy of the message for transmission using a second interleaving protocol different from the first interleaving protocol; and

transmitting the second copy of the message to the destination device.

2. The method of Claim 1 wherein the message and the second copy of the message are generated using a differential modulation protocol and further comprising the following performed by the destination device:

receiving the message to provide a first set of symbols associated with the message;

determining if the message was received without error;

transmitting the request for retransmission if the message was not received without error;

receiving the second copy of the message to provide a second set of symbols associated with the message; and

iteratively demodulating the first set of symbols and the second set of symbols using extrinsic information associated with the first set of symbols for demodulation of the second set of symbols to provide a set of symbol estimates for the message.

3. The method of Claim 2 wherein iteratively demodulating the first set of symbols and the second set of symbols using extrinsic information associated with the first set of symbols for demodulation of the second set of symbols further comprises iteratively demodulating the first set of symbols and the second set of symbols using extrinsic information associated with the first set of symbols for demodulation of the second set of symbols and extrinsic information associated with the second set of symbols for demodulation of the first set of symbols to provide a set of symbol estimates for the message.

4. The method of Claim 3 wherein iteratively demodulating the first set of symbols and the second set of symbols using extrinsic information associated with the first set of symbols for demodulation of the second set of symbols and extrinsic information associated with the second set of symbols for demodulation of the first set of symbols to provide a set of symbol estimates for the message further comprises:

demodulating the first set of symbols to provide the extrinsic information associated with the first set of symbols;

ordering the second set of symbols and the extrinsic information associated with the first set of symbols based on the first interleaving protocol and the second interleaving protocol so that the second set of symbols and the extrinsic information associated with the first set of symbols have a corresponding order;

demodulating the second set of symbols based on the second set of symbols and the extrinsic information associated with the first set of symbols to provide the extrinsic information associated with the second set of symbols;

ordering the first set of symbols and the extrinsic information associated with the second set of symbols based on the first interleaving protocol and the second interleaving protocol so that the first set of symbols and the extrinsic information associated with the second set of symbols have a corresponding order; and

demodulating the first set of symbols based on the first set of symbols and the extrinsic information associated with the second set of symbols to provide updated extrinsic information associated with the first set of symbols.

5. The method of Claim 4 wherein demodulating the first set of symbols based on the first set of symbols and the extrinsic information associated with the second set of symbols to provide updated extrinsic information associated with the first set of symbols is preceded by determining if the extrinsic information associated with the second set of symbols satisfies an acceptance criterion and providing the extrinsic information associated with the second set of symbols as the symbol estimates for the message if the extrinsic information associated with the second set of symbols satisfies the acceptance criterion and wherein demodulating the first set of symbols based on the first set of symbols and the extrinsic information associated with the second set of symbols to provide updated extrinsic information associated with the first set of symbols comprises demodulating the first set of symbols based on the first set of symbols and the extrinsic information associated with the second set of symbols to provide updated

extrinsic information associated with the first set of symbols if the second set of symbols does not satisfy the acceptance criterion.

6. The method of Claim 5 wherein demodulating the first set of symbols based on the first set of symbols and the extrinsic information associated with the second set of symbols to provide updated extrinsic information associated with the first set of symbols is followed by determining if the updated extrinsic information associated with the first set of symbols satisfies the acceptance criterion and providing the updated extrinsic information associated with the first set of symbols as the symbol estimates for the message if the updated extrinsic information associated with the first set of symbols satisfies the acceptance criterion.

7. The method of Claim 6 wherein ordering the second set of symbols and the extrinsic information associated with the first set of symbols based on the first interleaving protocol and the second interleaving protocol so that the second set of symbols and the extrinsic information associated with the first set of symbols have a corresponding order, demodulating the second set of symbols based on the second set of symbols and the extrinsic information associated with the first set of symbols to provide the extrinsic information associated with the second set of symbols, ordering the first set of symbols and the extrinsic information associated with the second set of symbols based on the first interleaving protocol and the second interleaving protocol so that the first set of symbols and the extrinsic information associated with the second set of symbols have a corresponding order, and demodulating the first set of symbols based on the first set of symbols and the extrinsic information associated with the second set of symbols to provide updated extrinsic information associated with the first set of symbols are iteratively repeated until the acceptance criterion is satisfied.

8. The method of Claim 6 wherein ordering the second set of symbols and the extrinsic information associated with the first set of symbols based on the first interleaving protocol and the second interleaving protocol so that the second set of symbols and the extrinsic information associated with the first set of symbols have a corresponding order, demodulating the second set of symbols based on the second set of symbols and the extrinsic information associated with the first set of symbols to provide the extrinsic information associated with the second set of symbols, ordering the first set

of symbols and the extrinsic information associated with the second set of symbols based on the first interleaving protocol and the second interleaving protocol so that the first set of symbols and the extrinsic information associated with the second set of symbols have a corresponding order, and demodulating the first set of symbols based on the first set of symbols and the extrinsic information associated with the second set of symbols to provide updated extrinsic information associated with the first set of symbols are iteratively repeated until either the acceptance criterion is satisfied or a maximum number of demodulation passes have occurred.

9. The method of Claim 6 wherein the first interleaving protocol comprises no interleaving.

10. The method of Claim 6 wherein a plurality of retransmission copies of the message are received, a first group of which are associated with the first interleaving protocol and a second group of which are associated with the second interleaving protocol and wherein iteratively demodulating the first set of symbols and the second set of symbols using extrinsic information associated with the first set of symbols for demodulation of the second set of symbols and extrinsic information associated with the second set of symbols for demodulation of the first set of symbols to provide a set of symbol estimates for the message is preceded by generating the first set of symbols based on the first group and the second set of symbols based on the second group.

11. The method of Claim 6 further comprising:

receiving a second request for retransmission of the message;

generating a third copy of the message for transmission using a third interleaving protocol different from the first and second interleaving protocols; and

transmitting the third copy of the message to the destination device; and

wherein the destination device performs the following:

determining if the second copy of the message was received without error;

transmitting the second request for retransmission of the message if the second copy of the message was not received without error;

receiving the third copy of the message to provide a third set of symbols associated with the message; and

wherein iteratively demodulating the first set of symbols and the second set of symbols using extrinsic information associated with the first set of symbols for demodulation of the second set of symbols and extrinsic information associated with the second set of symbols for demodulation of the first set of symbols to provide a set of symbol estimates for the message comprises iteratively demodulating the first set of symbols, the second set of symbols and the third set of symbols using extrinsic information associated with at least one of the first set of symbols and the third set of symbols for demodulation of the second set of symbols and using extrinsic information associated with at least one of the second set of symbols and the third set of symbols for demodulation of the first set of symbols and using extrinsic information associated with at least one of the first set of symbols and the second set of symbols for demodulation of the third set of symbols to provide a set of symbol estimates for the message.

12. The method of Claim 11 wherein iteratively demodulating the first set of symbols, the second set of symbols and the third set of symbols using extrinsic information associated with at least one of the first set of symbols and the third set of symbols for demodulation of the second set of symbols and using extrinsic information associated with at least one of the second set of symbols and the third set of symbols for demodulation of the first set of symbols and using extrinsic information associated with at least one of the first set of symbols and the second set of symbols for demodulation of the third set of symbols to provide a set of symbol estimates for the message further comprises:

ordering the third set of symbols and the extrinsic information associated with the first set of symbols and the second set of symbols based on the first, second and third interleaving protocols so that the third set of symbols and the extrinsic information associated with the first set of symbols and the second set of symbols have a corresponding order; and

demodulating the third set of symbols based on the third set of symbols and the extrinsic information associated with the first set of symbols and the second set of symbols to provide extrinsic information associated with the third set of symbols; and

wherein ordering the second set of symbols and the extrinsic information associated with the first set of symbols based on the first interleaving protocol and the second interleaving protocol so that the second set of symbols and the extrinsic information associated with the first set of symbols have a corresponding order

comprises ordering the second set of symbols and the extrinsic information associated with the first set of symbols and the third set of symbols based on the first, second and third interleaving protocols so that the second set of symbols and the extrinsic information associated with the first and third set of symbols have a corresponding order;

wherein demodulating the second set of symbols based on the second set of symbols and the extrinsic information associated with the first set of symbols to provide the extrinsic information associated with the second set of symbols comprises demodulating the second set of symbols based on the second set of symbols and the extrinsic information associated with the first set and third set of symbols to provide the extrinsic information associated with the second set of symbols;

wherein ordering the first set of symbols or the extrinsic information associated with the second set of symbols based on the first interleaving protocol and the second protocol so that the first set of symbols and the extrinsic information associated with the second set of symbols have a corresponding order comprises ordering the first set of symbols and the extrinsic information associated with the second set and third set of symbols based on the first, second and third interleaving protocol so that the first set of symbols and the extrinsic information associated with the second and third set of symbols have a corresponding order; and

wherein demodulating the first set of symbols based on the first set of symbols and the extrinsic information associated with the second set of symbols to provide updated extrinsic information associated with the first set of symbols comprises demodulating the first set of symbols based on the first set of symbols and the extrinsic information associated with the second and third set of symbols to provide updated extrinsic information associated with the first set of symbols.

13. The method of Claim 12 wherein demodulating the third set of symbols based on the third set of symbols and the extrinsic information associated with the first set of symbols and the second set of symbols to provide extrinsic information associated with the third set of symbols is followed by determining if the extrinsic information associated with the third set of symbols satisfies the acceptance criterion and providing the extrinsic information associated with the third set of symbols as the symbol estimates for the message if the extrinsic information associated with the third set of symbols satisfies the acceptance criterion.

14. The method of Claim 3 wherein the first interleaving protocol comprises no interleaving and wherein the retransmission based communication system comprises and automatic repeat request (ARQ) based communication system.

15. The method of Claim 3 further comprising:

receiving a second request for retransmission of the message;

generating a third copy of the message for transmission using a third interleaving protocol different from the first and second interleaving protocols; and

transmitting the third copy of the message to the destination device; and

wherein following receiving the second copy of the message the destination device performs the following:

determining if the second copy of the message was received without error;

transmitting the second request for retransmission of the message if the second copy of the message was not received without error;

receiving the third copy of the message to provide a third set of symbols associated with the message; and

wherein iteratively demodulating the first set of symbols and the second set of symbols using extrinsic information associated with the first set of symbols for demodulation of the second set of symbols and extrinsic information associated with the second set of symbols for demodulation of the first set of symbols to provide a set of symbol estimates for the message comprises iteratively demodulating the first set of symbols, the second set of symbols and the third set of symbols using extrinsic information associated with at least one of the first set of symbols and the third set of symbols for demodulation of the second set of symbols and using extrinsic information associated with at least one of the second set of symbols and the third set of symbols for demodulation of the first set of symbols and using extrinsic information associated with at least one of the first set of symbols and the second set of symbols for demodulation of the third set of symbols to provide a set of symbol estimates for the message.

16. A method for demodulation of a message comprising:

receiving a first copy of the message to provide a first set of symbols associated with the message and a second copy of the message to provide a second set of symbols, the first copy being associated with a first interleaving pattern and the second copy being

associated with a second interleaving pattern different from the first interleaving pattern; and

iteratively demodulating the first set of symbols and the second set of symbols using extrinsic information associated with the first set of symbols for demodulation of the second set of symbols to provide a set of symbol estimates for the message.

17. The method of Claim 16 wherein iteratively demodulating the first set of symbols and the second set of symbols using extrinsic information associated with the first set of symbols for demodulation of the second set of symbols to provide a set of symbol estimates for the message comprises iteratively demodulating the first set of symbols and the second set of symbols using extrinsic information associated with the first set of symbols for demodulation of the second set of symbols and extrinsic information associated with the second set of symbols for demodulation of the first set of symbols to provide a set of symbol estimates for the message.

18. The method of Claim 17 wherein the first and second copy of the message comprise differential modulated signals and wherein iteratively demodulating the first set of symbols and the second set of symbols using extrinsic information associated with the first set of symbols for demodulation of the second set of symbols and extrinsic information associated with the second set of symbols for demodulation of the first set of symbols to provide a set of symbol estimates for the message further comprises:

demodulating the first set of symbols to provide the extrinsic information associated with the first set of symbols;

ordering the second set of symbols and the extrinsic information associated with the first set of symbols based on the first interleaving protocol and the second interleaving protocol so that the second set of symbols and the extrinsic information associated with the first set of symbols have a corresponding order;

demodulating the second set of symbols based on the second set of symbols and the extrinsic information associated with the first set of symbols to provide the extrinsic information associated with the second set of symbols;

ordering the first set of symbols and the extrinsic information associated with the second set of symbols based on the first interleaving protocol and the second interleaving protocol so that the first set of symbols and the extrinsic information associated with the second set of symbols have a corresponding order; and

demodulating the first set of symbols based on the first set of symbols and the extrinsic information associated with the second set of symbols to provide updated extrinsic information associated with the first set of symbols.

19. The method of Claim 18 wherein demodulating the first set of symbols based on the first set of symbols and the extrinsic information associated with the second set of symbols to provide updated extrinsic information associated with the first set of symbols is preceded by determining if the extrinsic information associated with the second set of symbols satisfies an acceptance criterion and providing the extrinsic information associated with the second set of symbols as the symbol estimates for the message if the extrinsic information associated with the second set of symbols satisfies the acceptance criterion and wherein demodulating the first set of symbols based on the first set of symbols and the extrinsic information associated with the second set of symbols to provide updated extrinsic information associated with the first set of symbols comprises demodulating the first set of symbols based on the first set of symbols and the extrinsic information associated with the second set of symbols to provide updated extrinsic information associated with the first set of symbols if the second set of symbols does not satisfy the acceptance criterion.

20. The method of Claim 19 wherein demodulating the first set of symbols based on the first set of symbols and the extrinsic information associated with the second set of symbols to provide updated extrinsic information associated with the first set of symbols is followed by determining if the updated extrinsic information associated with the first set of symbols satisfies the acceptance criterion and providing the updated extrinsic information associated with the first set of symbols as the symbol estimates for the message if the updated extrinsic information associated with the first set of symbols satisfies the acceptance criterion.

21. The method of Claim 20 wherein ordering the second set of symbols or the extrinsic information associated with the first set of symbols based on the first interleaving protocol and the second interleaving protocol so that the second set of symbols and the extrinsic information associated with the first set of symbols have a corresponding order, demodulating the second set of symbols based on the second set of symbols and the extrinsic information associated with the first set of symbols to provide

the extrinsic information associated with the second set of symbols, ordering the first set of symbols and the extrinsic information associated with the second set of symbols based on the first interleaving protocol and the second interleaving protocol so that the first set of symbols and the extrinsic information associated with the second set of symbols have a corresponding order, and demodulating the first set of symbols based on the first set of symbols and the extrinsic information associated with the second set of symbols to provide updated extrinsic information associated with the first set of symbols are iteratively repeated until the acceptance criterion is satisfied.

22. The method of Claim 20 wherein ordering the second set of symbols and the extrinsic information associated with the first set of symbols based on the first interleaving protocol and the second interleaving protocol so that the second set of symbols and the extrinsic information associated with the first set of symbols have a corresponding order, demodulating the second set of symbols based on the second set of symbols and the extrinsic information associated with the first set of symbols to provide the extrinsic information associated with the second set of symbols, ordering the first set of symbols and the extrinsic information associated with the second set of symbols based on the first interleaving protocol and the second interleaving protocol so that the first set of symbols and the extrinsic information associated with the second set of symbols have a corresponding order, and demodulating the first set of symbols based on the first set of symbols and the extrinsic information associated with the second set of symbols to provide updated extrinsic information associated with the first set of symbols are iteratively repeated until either the acceptance criterion is satisfied or a maximum number of demodulation passes have occurred.

23. The method of Claim 20 wherein the first interleaving protocol comprises no interleaving.

24. The method of Claim 20 wherein a plurality of retransmission copies of the message are received, a first group of which are associated with the first interleaving protocol and a second group of which are associated with the second interleaving protocol and wherein iteratively demodulating the first set of symbols and the second set of symbols using extrinsic information associated with the first set of symbols for demodulation of the second set of symbols and extrinsic information associated with the

second set of symbols for demodulation of the first set of symbols to provide a set of symbol estimates for the message is preceded by generating the first set of symbols based on the first group and the second set of symbols based on the second group.

25. The method of Claim 24 wherein generating the first set of symbols based on the first group and the second set of symbols based on the second group comprises combining the first group to provide the first set of symbols and combining the second group to provide the second set of symbols

26. The method of Claim 24 wherein generating the first set of symbols based on the first group and the second set of symbols based on the second group comprises selecting a most recent one of the first group to provide the first set of symbols and selecting a most recent one of the second group to provide the second set of symbols.

27. The method of Claim 20 further comprising:

receiving a third copy of the message comprising differential modulated signals to provide a third set of symbol estimates, the third copy being associated with a third interleaving protocol different from the first and second interleaving protocols; and

wherein iteratively demodulating the first set of symbols and the second set of symbols using extrinsic information associated with the first set of symbols for demodulation of the second set of symbols and extrinsic information associated with the second set of symbols for demodulation of the first set of symbols to provide a set of symbol estimates for the message comprises iteratively demodulating the first set of symbols, the second set of symbols and the third set of symbols using extrinsic information associated with the at least one of first set of symbols and the third set of symbols for demodulation of the second set of symbols and using extrinsic information associated with at least one of the second set of symbols and the third set of symbols for demodulation of the first set of symbols and using extrinsic information associated with at least one of the first set of symbols and the second set of symbols for demodulation of the third set of symbols to provide a set of symbol estimates for the message.

28. The method of Claim 27 wherein iteratively demodulating the first set of symbols, the second set of symbols and the third set of symbols using extrinsic information associated with at least one of the first set of symbols and the third set of

symbols for demodulation of the second set of symbols and using extrinsic information associated with at least one of the second set of symbols and the third set of symbols for demodulation of the first set of symbols and using extrinsic information associated with at least one of the first set of symbols and the second set of symbols for demodulation of the third set of symbols to provide a set of symbol estimates for the message further comprises:

ordering the third set of symbols and the extrinsic information associated with the first set of symbols and the second set of symbols based on the first, second and third interleaving protocols so that the third set of symbols and the extrinsic information associated with the first set of symbols and the second set of symbols have a corresponding order; and

demodulating the third set of symbols based on the third set of symbols and the extrinsic information associated with the first set of symbols and the second set of symbols to provide extrinsic information associated with the third set of symbols; and

wherein ordering the second set of symbols and the extrinsic information associated with the first set of symbols based on the first interleaving protocol and the second interleaving protocol so that the second set of symbols and the extrinsic information associated with the first set of symbols have a corresponding order comprises ordering the second set of symbols and the extrinsic information associated with the first set of symbols and the third set of symbols based on the first, second and third interleaving protocols so that the second set of symbols and the extrinsic information associated with the first and third set of symbols have a corresponding order;

wherein demodulating the second set of symbols based on the second set of symbols and the extrinsic information associated with the first set of symbols to provide the extrinsic information associated with the second set of symbols comprises demodulating the second set of symbols based on the second set of symbols and the extrinsic information associated with the first set and third set of symbols to provide the extrinsic information associated with the second set of symbols;

wherein ordering the first set of symbols or the extrinsic information associated with the second set of symbols based on the first interleaving protocol and the second protocol so that the first set of symbols and the extrinsic information associated with the second set of symbols have a corresponding order comprises ordering the first set of symbols and the extrinsic information associated with the second set and third set of symbols based on the first, second and third interleaving protocol so that the first set of

symbols and the extrinsic information associated with the second and third set of symbols have a corresponding order; and

wherein demodulating the first set of symbols based on the first set of symbols and the extrinsic information associated with the second set of symbols to provide updated extrinsic information associated with the first set of symbols comprises demodulating the first set of symbols based on the first set of symbols and the extrinsic information associated with the second and third set of symbols to provide updated extrinsic information associated with the first set of symbols.

29. The method of Claim 28 wherein demodulating the third set of symbols based on the third set of symbols and the extrinsic information associated with the first set of symbols and the second set of symbols to provide extrinsic information associated with the third set of symbols is followed by determining if the extrinsic information associated with the third set of symbols satisfies the acceptance criterion and providing the extrinsic information associated with the third set of symbols as the symbol estimates for the message if the extrinsic information associated with the third set of symbols satisfies the acceptance criterion.

30. The method of Claim 17 wherein the first interleaving protocol comprises no interleaving and wherein the retransmission based communication system comprises an automatic repeat request (ARQ) based communication system.

31. The method of Claim 17 further comprising:

receiving a third copy of the message to provide a third set of symbols associated with the message, the third copy being associated with a third interleaving protocol different from the first and second interleaving protocols; and

wherein iteratively demodulating the first set of symbols and the second set of symbols using extrinsic information associated with the first set of symbols for demodulation of the second set of symbols and extrinsic information associated with the second set of symbols for demodulation of the first set of symbols to provide a set of symbol estimates for the message comprises iteratively demodulating the first set of symbols, the second set of symbols and the third set of symbols using extrinsic information associated with the first set of symbols and the third set of symbols for demodulation of the second set of symbols and extrinsic information associated with the

second set of symbols and the third set of symbols for demodulation of the first set of symbols and using extrinsic information associated with the first set of symbols and the second set of symbols for demodulation of the third set of symbols to provide a set of symbol estimates for the message.

32. A system for interleaving in a retransmission based communication system comprising:

an interleave circuit that applies a selected one of a plurality of interleaving protocols to a copy of a message to be transmitted;

a retransmission circuit that determines whether a retransmission copy of a transmit message is to be transmitted responsive to a received request for retransmission of the transmit message;

a selection circuit that selects a first one of the plurality of interleaving protocols for a first copy of the transmit message and a second one of the plurality of interleaving protocols different from the first one of the plurality of interleaving protocols for a retransmission copy of the transmit message; and

a transmitter that transmits the first copy and the retransmission copy of the transmit message.

33. The system of Claim 32 wherein the interleave circuit, the retransmission circuit, the selection circuit and the transmitter are associated with a transmitter station, the system further comprising a receiver station comprising:

a receiver that receives the transmitted first copy of the transmit message to provide a first set of symbols associated with the message and the transmitted retransmission copy of the transmit message to provide a second set of symbols associated with the message; and

an iterative demodulator that demodulates the first set of symbols and the second set of symbols using extrinsic information associated with the first set of symbols for demodulation of the second set of symbols to provide a set of symbol estimates for the message.

34. The system of Claim 33 wherein the iterative demodulator is further configured to demodulate the first set of symbols and the second set of symbols using

extrinsic information associated with the second set of symbols for demodulation of the first set of symbols.

35. The system of Claim 34 wherein the transmitter is configured to transmit using a differential modulation protocol and the receiver is configured to receive the first copy and the retransmission copy of the transmit message based on the differential modulation protocol and wherein the iterative demodulator comprises a soft-input, soft-output differential demodulator.

36. The system of Claim 35 wherein the differential modulation protocol is selected from the group consisting of differential binary phase shift keying (DBPSK), differential quadrature phase shift keying (DQPSK) and differential 8-phase shift keying (D8-PSK).

37. The system of Claim 35 wherein the receiver station further comprises:

an error detection circuit that determines if received messages are received without error; and

a transmitter that transmits a request for retransmission to the transmitter station responsive to the error detection circuit detecting an error in a received message.

38. The system of Claim 35 wherein the selection circuit is further configured to alternate transmitted copies of the transmit message between the first one of the interleaving protocols and the second one of the interleaving protocols and wherein the receiver station further comprises a combiner circuit that provides one first set of symbols to the iterative demodulator based on copies of the transmit message associated with the first one of the interleaving protocols and one second set of symbols to the iterative demodulator based on copies of the transmit message associated with the second one of the interleaving protocols.

39. The system of Claim 38 wherein the combiner circuit selects a most recently received one of the copies of the transmit message associated with the first one of the interleaving protocols as the first set of symbols and selects a most recently received one of the copies of the transmit message associated with the second one of the interleaving protocols as the second set of symbols.

40. The system of Claim 38 wherein the combiner circuit combines the copies of the transmit message associated with the first one of the interleaving protocols based on a combining algorithm to provide the first set of symbols and combines the copies of the transmit message associated with the second one of the interleaving protocols based on the combining algorithm to provide the second set of symbols.

41. The system of Claim 40 wherein the combining algorithm comprises maximum ratio combining.

42. The system of Claim 35 wherein the selection circuit selects at least three different ones of the interleaving protocols for different copies of the transmit message.

43. The system of Claim 42 wherein the receiver is further configured to receive a transmitted third copy of the transmit message to provide a third set of symbols, the third copy being associated with a third one of the interleaving protocols different from the first one and the second one of the interleaving protocols, and wherein the iterative demodulator iteratively demodulates the first set of symbols, the second set of symbols and the third set of symbols using extrinsic information associated with at least one of the first set of symbols and the third set of symbols for demodulation of the second set of symbols and using extrinsic information associated with at least one of the second set of symbols and the third set of symbols for demodulation of the first set of symbols and using extrinsic information associated with at least one of the first set of symbols and the second set of symbols for demodulation of the third set of symbols to provide a set of symbol estimates for the message.

44. The system of Claim 43 wherein the iterative demodulator further comprises an ordering circuit that orders the third set of symbols and the extrinsic information associated with the first set of symbols and the second set of symbols based on the first, second and third ones of the interleaving protocols so that the third set of symbols and the extrinsic information associated with the first set of symbols and the second set of symbols have a corresponding order, and orders the second set of symbols and the extrinsic information associated with the first set of symbols and the third set of symbols based on the first, second and third ones of the interleaving protocols so that the

second set of symbols and the extrinsic information associated with the first and third set of symbols have a corresponding order, and orders the first set of symbols and the extrinsic information associated with the second set of symbols and the third set of symbols based on the first, second and third ones of the interleaving protocols so that the first set of symbols and the extrinsic information associated with the second set of symbols and the third set of symbols have a corresponding order.

45. The system of Claim 44 wherein the iterative demodulator generates the extrinsic information associated with the first set of symbols, the second set of symbols and the third set of symbols.

46. The system of Claim 35 wherein the iterative demodulator further comprises an ordering circuit that orders the first set of symbols and the extrinsic information associated with the second set of symbols based on the first one of the interleaving protocols and the second one of the interleaving protocols so that the first set of symbols and the extrinsic information associated with the second set of symbols have a corresponding order and orders the second set of symbols and the extrinsic information associated with the first set of symbols based on the first one of the interleaving protocols and the second one of the interleaving protocols so that the second set of symbols and the extrinsic information associated with the first set of symbols have a corresponding order.

47. The system of Claim 46 wherein the iterative demodulator generates the extrinsic information associated with the first set of symbols, the second set of symbols and the third set of symbols.

48. A system for interleaving in a retransmission based communication system comprising:

a receiver that receives a first copy of a message to provide a first set of symbols associated with the message and a second copy of the message to provide a second set of symbols associated with the message, the first copy being associated with a first one of a plurality of interleaving protocols and the second copy being associated with a second one of the plurality of interleaving protocols different from the first one of the plurality of interleaving protocols; and

an iterative demodulator that demodulates the first set of symbols and the second set of symbols using extrinsic information associated with the first set of symbols for demodulation of the second set of symbols to provide a set of symbol estimates for the message.

49. The system of Claim 48 wherein the iterative demodulator is further configured to demodulate the first set of symbols and the second set of symbols using extrinsic information associated with the second set of symbols for demodulation of the first set of symbols.

50. The system of Claim 49 wherein the message is transmitted using a differential modulation protocol and the receiver is configured to receive the first and second copy of the message based on the differential modulation protocol and wherein the iterative demodulator comprises a soft-input, soft-output differential demodulator.

51. The system of Claim 50 wherein the differential modulation protocol is selected from the group consisting of differential binary phase shift keying (DBPSK), differential quadrature phase shift keying (DQPSK) and differential 8-phase shift keying (D8-PSK).

52. The system of Claim 50 further comprising:

an error detection circuit that determines if received messages are received without error; and

a transmitter that transmits a request for retransmission responsive to the error detection circuit detecting an error in a received message.

53. The system of Claim 50 wherein a plurality of copies of the message are received by the receiver, a first group of which are associated with the first one of the interleaving protocols and a second group of which are associated with the second one of the interleaving protocols, the system further comprising a combiner circuit that provides one first set of symbols to the iterative demodulator based on the first group and one second set of symbols to the iterative demodulator based on the second group.

54. The system of Claim 53 wherein the combiner circuit selects a most recently received one of the first group as the first set of symbols and selects a most recently received one of the second group as the second set of symbols.

55. The system of Claim 53 wherein the combiner circuit combines the first group based on a combining algorithm to provide the first set of symbols and combines the second group based on the combining algorithm to provide the second set of symbols.

56. The system of Claim 55 wherein the combining algorithm comprises maximum ratio combining.

57. The system of Claim 50 wherein the receiver is further configured to receive a third copy of the transmit message to provide a third set of symbols, the third copy being associated with a third one of the interleaving protocols different from the first one and the second one of the interleaving protocols, and wherein the iterative demodulator iteratively demodulates the first set of symbols, the second set of symbols and the third set of symbols using extrinsic information associated with at least one of the first set of symbols and the third set of symbols for demodulation of the second set of symbols and using extrinsic information associated with at least one of the second set of symbols and the third set of symbols for demodulation of the first set of symbols and using extrinsic information associated with at least one of the first set of symbols and the second set of symbols for demodulation of the third set of symbols to provide a set of symbol estimates for the message.

58. The system of Claim 57 wherein the iterative demodulator further comprises an ordering circuit that orders the third set of symbols and the extrinsic information associated with the first set of symbols and the second set of symbols based on the first, second and third ones of the interleaving protocols so that the third set of symbols and the extrinsic information associated with the first set of symbols and the second set of symbols have a corresponding order, and orders the second set of symbols and the extrinsic information associated with the first set of symbols and the third set of symbols based on the first, second and third ones of the interleaving protocols so that the second set of symbols and the extrinsic information associated with the first and third set

of symbols have a corresponding order, and orders the first set of symbols and the extrinsic information associated with the second set of symbols and the third set of symbols based on the first, second and third ones of the interleaving protocols so that the first set of symbols and the extrinsic information associated with the second set of symbols and the third set of symbols have a corresponding order.

59. The system of Claim 58 wherein the iterative demodulator generates the extrinsic information associated with the first set of symbols, the second set of symbols and the third set of symbols.

60. The system of Claim 50 wherein the iterative demodulator further comprises an ordering circuit that orders the first set of symbols and the extrinsic information associated with the second set of symbols based on the first one of the interleaving protocols and the second one of the interleaving protocols so that the first set of symbols and the extrinsic information associated with the second set of symbols have a corresponding order and orders the second set of symbols and the extrinsic information associated with the first set of symbols based on the first one of the interleaving protocols and the second one of the interleaving protocols so that the second set of symbols and the extrinsic information associated with the first set of symbols have a corresponding order.

61. The system of Claim 60 wherein the iterative demodulator generates the extrinsic information associated with the first set of symbols, the second set of symbols and the third set of symbols.

62. A system for iterative demodulation of a message comprising:

means for receiving a first copy of the message to provide a first set of symbols associated with the message and a second copy of the message to provide a second set of symbols, the first copy being associated with a first interleaving pattern and the second copy being associated with a second interleaving pattern different from the first interleaving pattern; and

means for iteratively demodulating the first set of symbols and the second set of symbols using extrinsic information associated with the first set of symbols for demodulation of the second set of symbols and extrinsic information associated with the

second set of symbols for demodulation of the first set of symbols to provide a set of symbol estimates for the message.

63. A system for interleaving in a retransmission based communication system comprising:

means for generating a message for transmission using a first interleaving protocol;

means for transmitting the message to a destination device;

means for receiving a request for retransmission of the message;

means for generating a second copy of the message for transmission using a second interleaving protocol different from the first interleaving protocol; and

means for transmitting the second copy of the message to the destination device.

64. The system of Claim 63 wherein the message and the second copy of the message are generated using a differential modulation protocol and wherein the destination device further comprises:

means for receiving the message to provide a first set of symbols associated with the message;

means for determining if the message was received without error;

means for transmitting the request for retransmission if the message was not received without error;

means for receiving the second copy of the message to provide a second set of symbols associated with the message; and

means for iteratively demodulating the first set of symbols and the second set of symbols using extrinsic information associated with the first set of symbols for demodulation of the second set of symbols and extrinsic information associated with the second set of symbols for demodulation of the first set of symbols to provide a set of symbol estimates for the message.

65. The system of Claim 64 wherein the means for iteratively demodulating the first set of symbols and the second set of symbols using extrinsic information associated with the first set of symbols for demodulation of the second set of symbols and extrinsic information associated with the second set of symbols for demodulation of

the first set of symbols to provide a set of symbol estimates for the message further comprises:

means for demodulating the first set of symbols to provide the extrinsic information associated with the first set of symbols;

means for ordering the second set of symbols and the extrinsic information associated with the first set of symbols based on the first interleaving protocol and the second interleaving protocol so that the second set of symbols and the extrinsic information associated with the first set of symbols have a corresponding order;

means for demodulating the second set of symbols based on the second set of symbols and the extrinsic information associated with the first set of symbols to provide the extrinsic information associated with the second set of symbols;

means for ordering the first set of symbols and the extrinsic information associated with the second set of symbols based on the first interleaving protocol and the second interleaving protocol so that the first set of symbols and the extrinsic information associated with the second set of symbols have a corresponding order; and

means for demodulating the first set of symbols based on the first set of symbols and the extrinsic information associated with the second set of symbols to provide updated extrinsic information associated with the first set of symbols.